



# Wild

# Ideas,

# Wild

# Inventions



**Wild plants and animals have inspired some of the world's great inventions.**



Have you ever gone for a hike and come back with burrs stuck to your clothes? George de Mestral did. Picking the burrs off one day in the 1940s, the Swiss inventor started wondering how they might be put to good use. He looked at the burrs under a microscope and discovered they have tiny hooks that grab onto clothing. He began experimenting with ways to make fabric with burrlike hooks that could stick to other fabric. Eventually he was able to manufacture tiny nylon hooks that could both hold tight to fabric and let go when needed. And so he invented Velcro.

From powerful glues to vivid hues, living things have traits any human might envy. Since the earliest times, inventors have watched how nature solves challenges, then used the lessons nature taught them to make things that are useful to people.

**By Mary Hoff**

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## Pain Relief

Thousands of years ago, the Greek physician Hippocrates recommended his patients chew willow leaves to relieve pain. American Indians brewed tea from various willow plant parts to reduce fever and chewed bark to soothe toothaches.

Many years later, chemists studied willow. They found it contains salicin, a chemical with pain-relieving properties. Using salicin as their starting point, they invented the key pain-relieving in-

redient of aspirin, acetylsalicylic acid. Today, scientists travel to wild places and talk with local people in search of unusual plants with compounds that might make good medicine.

## First Paper Makers

If you've seen a wasp's nest up close, you know that wasps are experts at making thin layers of papery material. In the second century, a Chinese court official named Cai Lun noticed this too.

He watched the insects chew plants, then spit out the fibers to make their nests. He followed their example, pounding plants to break down the fibers, adding water, then spreading the fiber soup out to dry. Today, paper is still made in a similar way.



## Wright About Flight

People have long looked at birds and marveled at their flight. In the late 15th century, Italian inventor and artist Leonardo da Vinci drew many pictures of birds' wings and tails, trying to figure out how they keep their owners aloft. He drew pictures of a flying machine with wings that flapped.

About 400 years later, the brothers

Orville and Wilbur Wright also studied bird flight. They noticed how the shape of birds' wings allowed air to flow around them in a way that lifted them into the air. They built many models of machines to mimic bird flight. In 1903 the Wright brothers made the first human flight using a machine with wings.



## Beak Quiet

The West Japan Railway Company had a problem with its super-speedy bullet train. The train went so fast that the sound waves piled up in front of it and made a loud noise when the train zoomed out of a tunnel.

Fortunately, the company had an engineer who was also a birdwatcher. Eiji Nakatsu remembered that a bird called

the kingfisher makes barely a ripple when it dives beak first from the air into water. Using the shape of the kingfisher's strong, sharp beak as a model, Nakatsu redesigned the front of the train. The sleek new train with a pointed front is not only quieter, it also travels faster and uses less energy than the older model.

## Catch More Light

If you could look very closely at a fly's eye, you would see that it is made up of many individual tubes, each with a rounded top. This structure allows the eye to capture much more light than a single eyeball would.

Capture lots of light? That's just what we want solar panels to do when they make electricity from the sun. Researchers from Italy studied fly eyes, then developed a new shape for the light-capturing structures in solar panels. The "bioinspired" compound lenses gather light much better than ordinary solar panels do. The researchers hope that better light-gathering will help make solar energy cheaper so more people will use it.



## Floating Wetlands

Wetlands are wonderful for cleaning water. Wetland plants soak up nitrogen and phosphorus, chemicals found in sewage and in water that runs off fertilized land. If these chemicals end up in a lake or pond, they can pollute it. If wetlands capture the chemicals, the lake can stay clean.

Bruce Kania wanted to help clean up lakes sickened by too much nitrogen

and phosphorus. He looked to nature for help. He built a small floating island from recycled plastic. Then he planted it with chemical-absorbing plants and floated it on a pond. As the plants grew tall, they absorbed nitrogen and phosphorus. Now Kania sells his wetland-inspired islands in the United States, South Africa, New Zealand, and other countries.





## Shock Absorber

When a woodpecker pecks at a tree, its head takes a real pounding. How does it keep from damaging its brain?

Scientists looking for an answer to that question found four structures in the woodpecker's head that help absorb the blow: a shock-absorbing beak, a springlike support for its tongue, a spongy part of the skull, and a very

small fluid-filled space between the bird's skull and brain.

Engineers used this model to design a container that can protect its contents from impacts. Possible uses include crash-proofing race cars, designing better football helmets, and preventing spacecraft from being damaged when they collide with space junk.



## Slick as a Duck

What can we learn from a duck? One thing is how to shed water! Even when paddling about in pouring rain, a duck stays dry.


Scientists from Hong Kong and Minnesota studied duck feathers under a super-high-powered microscope. They saw that the feathers were made up of very tiny scales. To make super-water-repellent

fabric, they covered the fabric with scales similar to duck feathers and a coating that mimicked the water-repelling action of a duck's natural oils. The slick fabric sheds so well that it stays dry *and* clean.



## Imagine Something New

Name some things people have invented—or imagine what you might someday invent—based on lessons learned from observing these natural things: ant colonies, duck feet, fireflies, fish scales, flower scents, frog toes, hummingbird wings, maple seeds, owl eyes, spider webs.

What sparks your imagination? Next time you're outdoors, look around you for ideas. If you have a problem, ask, "How would nature solve this?" You might be surprised at the answers you'll find. 

To learn more about how people imitate natural things and to test your ideas, visit [www.biomimicryinstitute.org/education/k-12/biomimicry-youth-challenge.html](http://www.biomimicryinstitute.org/education/k-12/biomimicry-youth-challenge.html)

### A NOTE TO TEACHERS

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